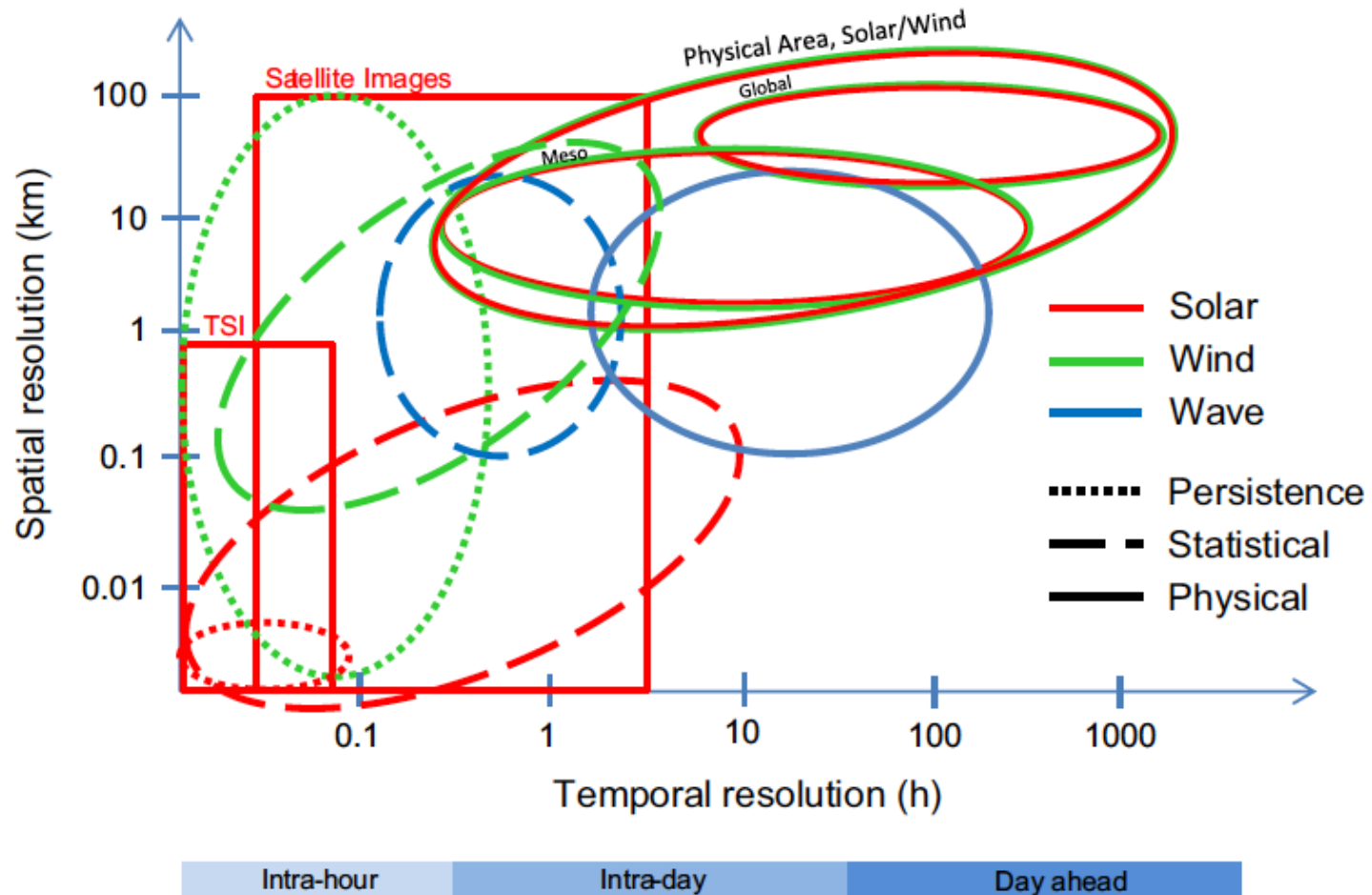




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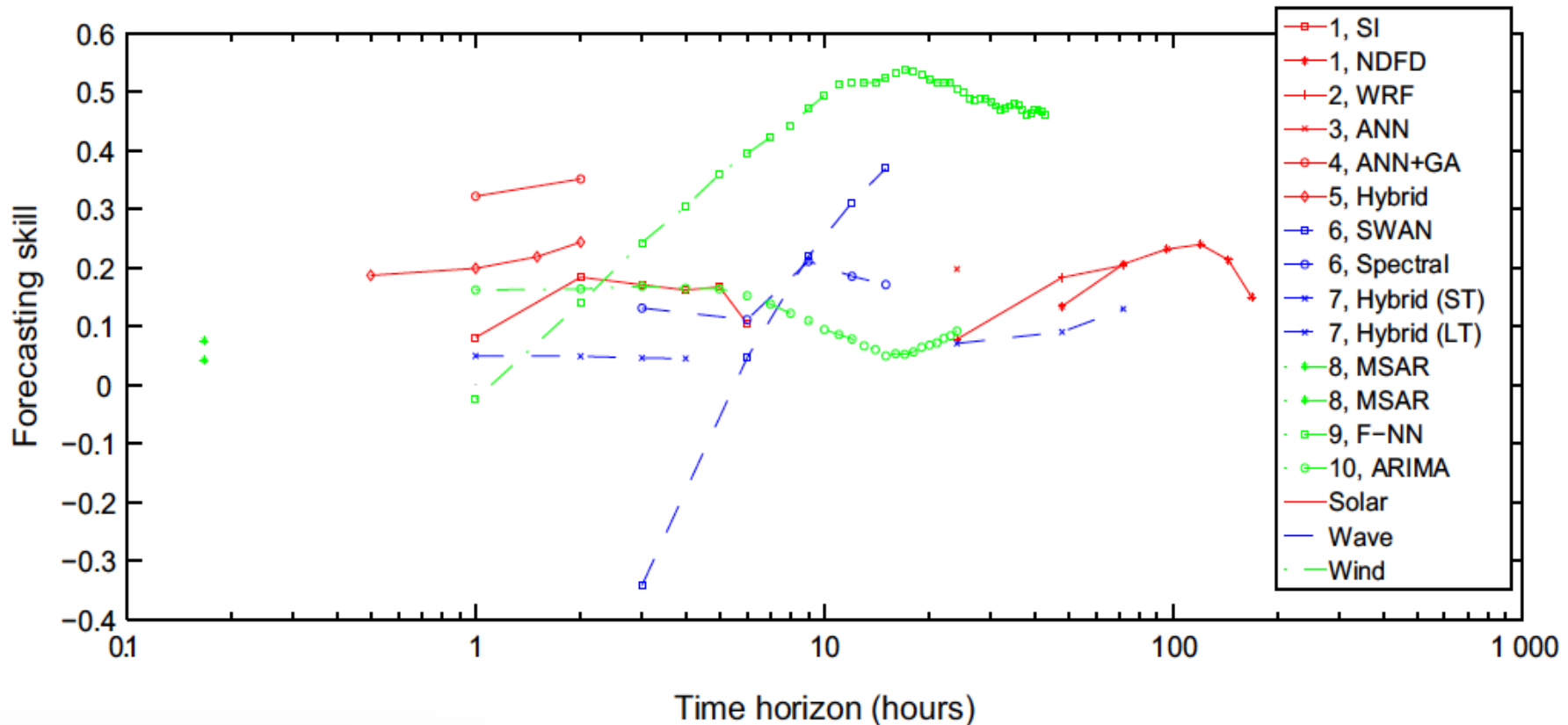
National Oceanic and Atmospheric
Administration

Renewable Energy Forecast Methods



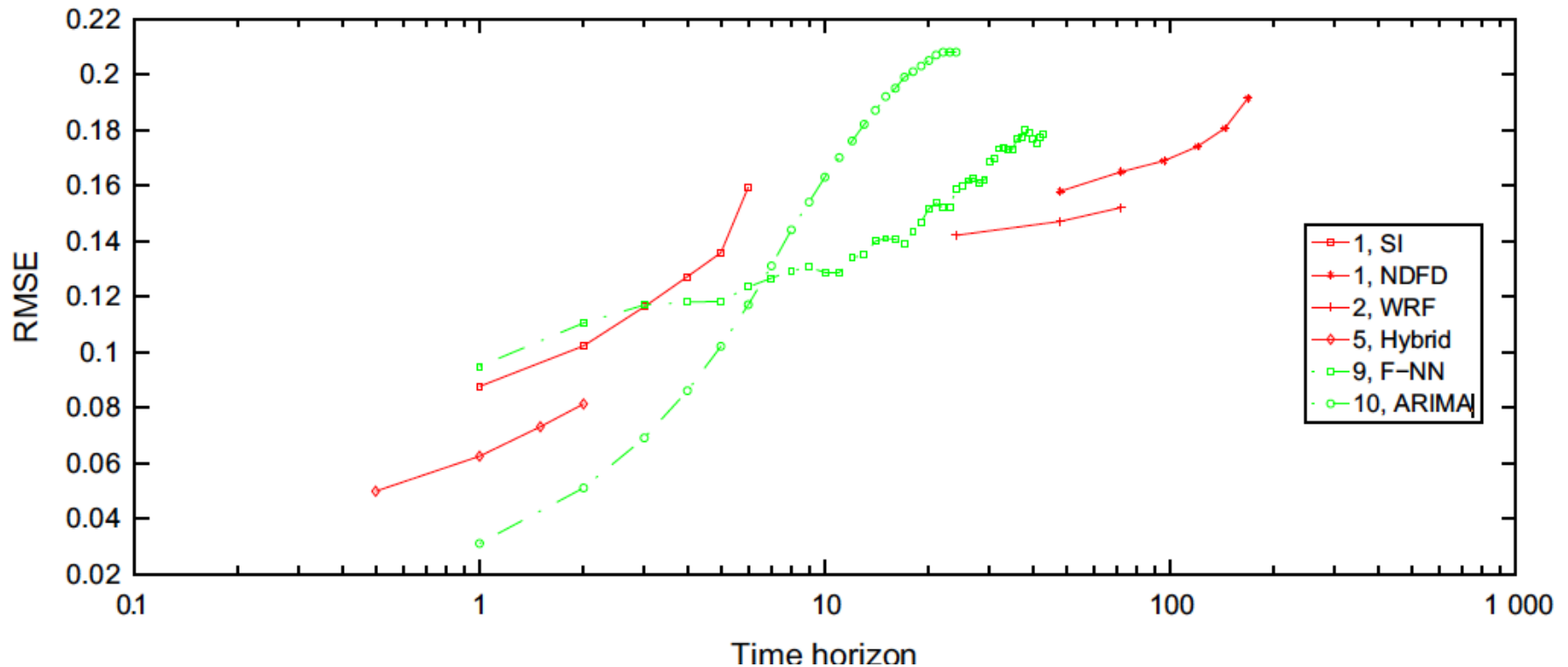
From Widén et al. 2015, Renewable and Sustainable Energy Reviews, 44, 356-375.

Example Forecast Skill Scores



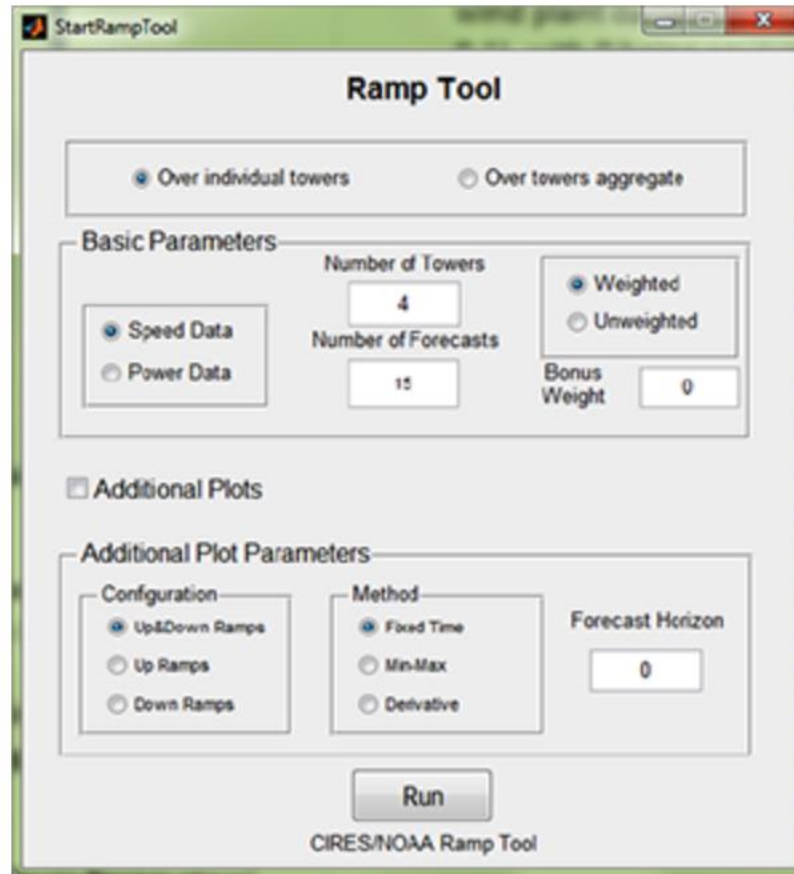
From Widén et al. 2015, Renewable and Sustainable Energy Reviews, 44, 356-375.

Comparison of Forecast Method RMSE



From Widén et al. 2015, Renewable and Sustainable Energy Reviews, 44, 356-375.

Wind Ramp Metric Tool



The screenshot shows a software window titled "StartRampTool" with a sub-header "Ramp Tool". The interface is organized into several sections:

- Selection:** Two radio buttons at the top: "Over individual towers" (selected) and "Over towers aggregate".
- Basic Parameters:** A section containing:
 - A group box with "Speed Data" (selected) and "Power Data".
 - Input fields for "Number of Towers" (value: 4) and "Number of Forecasts" (value: 15).
 - A group box with "Weighted" (selected) and "Unweighted".
 - A "Bonus Weight" input field with value: 0.
- Additional Plots:** A checkbox labeled "Additional Plots" which is currently unchecked.
- Additional Plot Parameters:** A section containing:
 - A group box for "Configuration" with "Up&Down Ramps" (selected), "Up Ramps", and "Down Ramps".
 - A group box for "Method" with "Fixed Time" (selected), "Min-Max", and "Derivative".
 - A "Forecast Horizon" input field with value: 0.
- Run Button:** A large button labeled "Run" at the bottom center.
- Footer:** The text "CIRES/NOAA Ramp Tool" is displayed at the very bottom.

https://www.esrl.noaa.gov/psd/products/ramp_tool/

General Research Needs for Renewable Energy Forecasting

- More and better data, e.g., vertical profiles of wind, temp, humidity), clouds, surface irradiance (DNI, DHI, and GHI), etc.
- Better understanding of boundary layer processes and improved representation of them in NWP models
- Increased HPC resources
- Improved data management, e.g., data archival and accessibility, common data formats, metadata)
- Improved and coordinated metrics to measure forecast skill
- User engagement (e.g., input into research planning and operational use)